

Reply To: 3400

Date: June 12, 1992

Subject: Stockton Fire Insect Problems (Report no. S-92-03)

To: District Ranger, Cajon Ranger District
San Bernardino National Forest

The Stockton Fire burned approximately 1200 acres in August, 1991, on the North Fork of Lytle Creek, Cajon Ranger District. Of the burned area, approximately half is topographically accessible and adequately stocked to be suitable for salvage. The stand is primarily composed of mature Jeffrey and ponderosa pines, with scattered bigcone Douglas-fir, white fir, sugar pine, and incense-cedar. Elevation varies from approximately 6,000 to 6,800 feet.

On May 29 I visited the site with Karen McKinley to examine the trees for insect damage. Some of the fire killed trees had been felled for a public firewood sale. Ips engraver beetles were found in the felled pines. In addition, bark beetles of the genus Dendroctonus were observed attacking a standing fire damaged ponderosa pine. Finally, an otherwise healthy Jeffrey pine had several large pitch masses indicative of feeding by a lepidopteran such as the sequoia pitch moth. An immature collected from one pitch mass was reared and will be sent to an expert for identification.

Both the Ips and the Dendroctonus bark beetles have potential for causing significant damage to the residual stand. The former may emerge from the slash and cause localized tree mortality or top-killing. Bark beetles in the genus Dendroctonus, such as the western pine beetle, often attack weakened trees, including those weakened by fire. Attacks may spill over onto nearby healthy trees.

Pitch mass boring moths are poorly understood, and the specimen collected is not in either of the two genera (Synanthedon and Dioryctria) commonly found in that situation. Pitch mass borers are rarely of economic importance in a forest. Although the larvae feed on phloem, the damage is localized. Branches are sometimes girdled and killed, and the masses of pitch which fall to the ground can be a nuisance in high use areas. The presence of this insect is unlikely to be related to the fire.

The area around the North Fork of Lytle Creek is being managed for recreation, watershed, and wildlife. Some of the trees in the lower portion of the burn have been removed as part of a public fuelwood sale. Current plans involve selling the remainder of the dead and severely damaged trees in a commercial sale.

Management options for the two genera of bark beetles present include (1) no action (leave remaining dead trees on the site), (2) sale of dead and severely injured trees as planned, (3) improving the vigor of the stand by removal of uninjured or lightly injured trees likely to be attacked by bark beetles, and (4) treatment of residual high value trees with insecticide to prevent bark beetle attack.

I have enclosed four documents for background information and discussion of these options. These are: a summary of western pine beetle biology, information on management of slash with respect to engraver beetles, a Forest Pest Management evaluation conducted after the Panorama Fire on the San Bernardino National Forest (FPM Report No. 81-5), and a leaflet from CDFFP on treatment of slash.

One issue not discussed in these documents is the sale of infested or green material to the public. It is possible that if infested material is removed from the site and taken to areas with high value landscape pines, and perhaps stacked against them, the high value trees could be killed. The public may consider the Forest Service liable for mortality in high value trees. The enclosed leaflet from CDFFP may be useful in educating the public on proper treatment of infested or green wood.

It should be noted that beetles emerging from slash within the forest may not present a high hazard to nearby trees, particularly if they are growing vigorously, such as when precipitation has been higher than normal.

If you have further questions, please do not hesitate to call me.

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Western Pine Beetle

The western pine beetle, Dendroctonus brevicomis, breeds in the main bole of living ponderosa and Coulter pine larger than about 4 inches dbh. Normally it breeds in trees weakened by drought, overstocking, root disease, dwarf mistletoe or fire.

Adult beetles emerge and attack trees continuously from spring through fall. Depending on the latitude and elevation, there can be from one to four generations per year. The generations are difficult to distinguish because the prolonged period of initial attack and re-emergence of parent females to establish additional broods causes considerable overlapping of the generations.

Initial attacks are made about mid-bole and subsequent attacks fill in above and below. Pheromones released during a successful attack attract other western pine beetles. Attacking beetles may spill over onto nearby apparently healthy trees and overwhelm them by sheer numbers. Pitch tubes and red boring dust are indications of successful attacks.

Adults bore a sinuous gallery pattern in the cambium and the female lays eggs in niches along the sides. The larvae feed in the inner bark for a short distance and then turn into the outer bark to complete development.

Bluestain fungi introduced during successful attacks probably contribute to the rapid mortality associated with bark beetle attacks.

Woodpeckers, predaceous beetles and low winter temperatures cause natural control. Silvicultural activities that result in rapid, vigorous tree growth increases tree resistance and prevents mortality. Individual high value trees undergoing a temporary reversible stress, such as drought, can be protected for up to a year by applying insecticides to the bole.

PINE ENGRAVERS

Complacency in slash treatment --

"The threat of outbreaks posed by insects breeding in residues is generally overrated. Graham (1922) and Craighead et al. (1927) long ago concluded that the insect menace posed by slash is more theoretical than real. Entomologists today generally agree. However, it is well to treat ips with respect for the pine engraver problem associated with the creation of slash is unpredictable. There are years when no trees are killed, despite suitable slash and lots of beetles. These same conditions in other years lead to unacceptable tree mortality. Therefore, it is best to follow recommended practices and not to grow complacent because one has 'lucked out' for a couple of years."

The critical factor appears to be the vigor of the residual green trees in late summer. There generally is no tree mortality when precipitation in April, May and June is normal or greater; an 'ips year' occurs when precipitation in those key months is below normal. That, at least, is what general correlations suggest." (Dolph 1971)

A question facing foresters is whether the beneficial aspects of engravers aiding in residue fragmentation outweigh the reasons for removing residues.

SLASH TREATMENT

Broad statements are not possible. Considerations to be taken into account are 1) species of tree, 2) character of slash, 3) species of insect involved.

Concern: 1) Slash attracting insects from the surrounding forest and concentrating them in the vicinity of the slash, where they kill living trees; 2) slash supplying breeding material for insects which emerge and kill mature standing timber or seedlings, saplings and poles.

The main concern is slash from PINE, SPRUCE and DOUGLAS-FIR. The slash of fir, larch, redwood, hemlock, cypress, cedar and juniper either breeds insects of very little significance as tree killers, or the trees killed are so few or of so little value as to be of small economic importance.

PINE

BEST	All lopped and exposed to sun.	< # of beetles produced
	Only vertical limbs lopped.	
	Unlopped.	
WORST	Lopped and piled.	> # of beetles produced

Worst time to create slash -- January to mid-July.

A. Prompt Slash Disposal

Dozer trampling (crushing); disking and trampling = chopping
Chipping
Plastic "Greenhouse"
Lopping (limbing)
Lop and scatter
Burning
Burying
Removal

B. Prompt Slash Disposal Impractical

Where general slash disposal is impractical, scattering the slash into openings where it is exposed to direct sunlight dries it out faster, and dry slash is unsuitable for beetle development.

C. Green Chain Technique

A good pine engraver year is usually one in which:

- a. the winter is abnormally dry,
- b. warm weather lasts late into the fall and occurs early in the spring,
- c. spring rains are few with long periods between what rains occur.

MATERIAL USUALLY NOT PRODUCING LARGE BROODS:

1. Lopped material less than 3 inches diameter
2. Very large logs
3. Material with bark > 1 in in thickness is seldom attacked (excluding unlopped tree tops).
4. Old, soured or partially dry slash. (The objective of slash disposal treatments is to create this type of slash before infestation).
5. Thinning slash is not particularly good breeding material, but it is often densely attacked. This aggregation of beetles can result in tree killing when the recent problems of severe competition and the shock of sudden exposure to full sunlight are compounded by drought.
6. Trees treated with silvicide and slash therefrom.

MATERIAL CONDUCIVE TO THE DEVELOPMENT OF LARGE BROODS OF ENGRAVERS.

1. Most productive -- stem portions of unlopped tree tops varying in basal diameter from 10-20 inches or more.
2. Piled green slash of any dimension.
3. Concentrations of freshly-cut slash on the ground in full or partial shade.
4. Unlopped tree tops and other slash and debris created from January through June.
5. Most important source of breeding material in logging slash is the main stem from about 3 inches and up.
6. The main stem of a top is potentially more dangerous than limbs, particularly if the limbs are severed.

7. Shading with miscellaneous logging debris will offset lopping and sunlight.
8. Slash 6 to 24 inches diameter cut after January 1.
9. Piled pine pulpwood or logs.
10. Pines girdled for understory release.
11. Branches and tops of pines broken off by snow.
12. Pines girdled by porcupines.
13. Suppressed pines.
14. Shaded slash and the underside of logs.

BEST MANAGEMENT PRACTICES.

Keep track of amount of slash laid down by windstorms

Check lightning stuck trees whenever a fresh strike is seen.

When practical, cut young-growth pine after 7/15.

Lop and scatter all slash -- expose main stem to sun.

Utilize to minimum top diameter practicable.

Keep accumulations of slash or green logs away from living trees, and fell trees away from dense thickets of young-growth.

When necessary, kill broods by best means.

Prevent accumulation of felled material (avoid cutting practices, patterns, conducive to windthrow)

Alternate stand structure and species composition to reduce susceptibility.

Log infested and threatened stands -- 1st priority: stands with heavy populations and/or large volumes per acre.

Remove dead and infested trees from campgrounds before emergence.

Surveillance (monitoring) -- not treatment is necessary if there are few beetles. - reddish boring dust on upper surfaces and on ground under slash
- Y, I, or H-shaped egg galleries; Y-shaped most common.
- no pitch tubes

Salvage windthrows as soon as possible.

Residue treatments to minimize damage is most effective if applied before the thinning slash is attacked.

In high risk areas, such as campgrounds, use method(s) that prevent aggregation of many attacking beetles in proximity to residual trees.

Avoid trimming along power lines and other rights-of-way, running logging equipment over root systems of residual trees (designate skid trails), or other practices which may injure trees during periods of hot dry weather.

Destroy slabs from portable sawmills operating in forested areas.

Do not leave any ponderosa pine slash in a position that will prevent it from drying out quickly. When slash must be piled, plan to do it after mid-October, or treat by chipping or some other destructive method.

Intensive utilization and clean logging -- eliminate much of the slash and make it possible to more efficiently and effectively treat the slash in fuel and insect management.

Slash piled or bunched for burning or for wildlife habitat should be allowed to dry before the piling operation.

AVOID THESE WORST MANAGEMENT PRACTICES:

Piling fresh slash in any season without further treatment.

Letting slash or green logs accumulate near living trees.

Piling bucked limbs and cull logs along any forested roadside for fuelwood without prior treatment.

Windrowing fresh slash without drying (or partial drying).

Sporadic cutting in the spring of the year, with the slash unlopped and unscattered.

Removal of infested material to developed areas where emerging beetles can attack high value trees that may be stressed by improper site manipulations.

Piecemeal treatments -- measures to suppress beetle populations in thinning residues will minimize damage only if applied comprehensively on a regular basis.

Piling fresh slash adjacent to standing trees.

Best recommendation: Prevent stagnated or highly competitive growth conditions in stands.

Brood Material --

Man-caused

pine logging slash

pinos damaged during logging of other trees

fire-damaged pinos

pine pulpwood or log piles

right-of-way clearing slash

pinos girdled for understory release

Natural

trees weakened by other insects or other factors

branches and tops of pinos broken off by snow

pinos girdled by procupinos

pinos suppressed from competition

diseased pinos

Soils at field capacity at the beginning of the growing season will be nearly exhausted of moisture reserves by late July and early August if rainfall is below normal. Coincidentally, it is during this period that adult pine engravers are emerging at a fairly constant rate. However, moisture stress alone will not normally induce an outbreak. Stress must be coupled with brood material to provide the population increase necessary to produce tree killing.

Thinning after June 15: most available soil moisture is used and thinning will not provide any additional moisture for the residual stand. What you will get is increased soil temperatures and a higher evapo-transpiration stress.

Two situations which should be avoided at all seasons are piling fresh pine slash without further treatment, and allowing slash or green logs to accumulate near living trees.

California five-spined ips --

Beetles begin to emerge from spring-infested debris about the same time that trees first experience moisture stress and the result can be considerable tree mortality in nearby stands.

Even in areas where pines are few, pine slash can be heavily infested.

LITERATURE CITED

- Dolph, R.E. 1971. Oregon pine ips infestation from red slash to green trees. In D.M. Baumgartner (Ed.) Precommercial thinning of coastal and intermountain forests in the Pacific Northwest, pp. 53-62. Washington State University, Pullman, WA.